

Science

ROBERT E. YAGER AND JOHN E. PENICK

New Concerns for Affective Outcomes in School Science

Science is not a popular subject in schools. Science teachers, in fact, often expect students to have negative attitudes toward their classes (Yager and Penick 1986). After all, science is difficult and requires considerable effort from even the best students. It's meant to be challenging, not fun.

Studies over the years have supported this commonly held belief that students do not enjoy the subject or see its value in their lives. The Third Assessment of Science by the National Assessment of Educational Progress (NAEP 1978) included extensive batteries of items from the affective domain, especially for the 13- and 17-year-old age groups. Although this assessment found that students have extremely negative attitudes about science, these disappointing results did not elicit much concern from science teachers, school officials, or the general public. The Fourth NAEP Assessment (Huefle et al. 1983) revealed similar negative results and produced similar complacency on the part of those studying the results. But the Fifth Assessment of Science, to be released by the end of 1987, is generating great interest in the results from the affective domain.

This new interest stems from recent reports of the dramatic differences found between classrooms where science is taught through traditional means and classrooms where exemplary science teaching flourishes. Much of this evidence comes from the science teaching profession. For example, the National Science Teachers Association has identified school programs that closely match established criteria of Excellence in Science Education programs. And some of these exemplary programs have involved assessments in a variety of domains, not

just the traditional cognitive aspect. Results from these excellent programs indicate that having positive attitudes about the subject greatly influences students' achievement in scientific knowledge and process. These results have prompted teachers to question their old views that the affective domain is inconsequential in defining an exemplary program or in suggesting new directions.

For example, Jefferson County Schools (Lakewood, Colorado) provide striking results. With exemplary programs across the entire K-12 spectrum, Jefferson County shows phenomenally positive affects among the district's students. According to Simmons and Yager (1987), the most learning occurs when affective measures remain high, or actually improve, over the 13 years of K-12 education.

Likewise, studies in the middle/junior high at Imperial, Missouri, where students help resolve local problems as part of the school program, show dramatically how student attitudes about science remain positive throughout their school careers.

Similarly, as a result of their participation in the exemplary Science/Technology/Society (STS) program at Wausau, Wisconsin, students' attitudes are more positive toward science classes and their usefulness, and students have expressed a greater interest in science careers. Either the exemplary STS program produces the better student attitudes, or concern for positive attitudes is a prerequisite for the success of exemplary programs.

Results from the Iowa Chautauqua Program, which is supported by the National Science Foundation and the Iowa Utility Associate, indicate similar trends. In Iowa some 250 teachers of grades 4 through 9 have participated in a year-long program to introduce

STS materials and procedures. Teachers report that students' attitudes have improved and their achievement is increasing.

The affective results released by NAEP provide norms for all schools and all levels for a ten-year period. School staffs interested in improving their science programs should look anew at the NAEP items, the influence of the affective domain, and the outcomes of exemplary programs. Teachers can assess their own students and compare their science programs to both norms and examples. The comparison may help them see how important it is to develop the positive student attitudes associated with understanding, interest, and involvement. □

References

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Robert E. Yager and John E. Penick are Professors of Science Education, Science Education Center, University of Iowa, Iowa City, IA 52242.

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